

pot 150 pounds in weight was carried 200 yards and left in the track. Two boys were carried some distance, one being found 200 yards from the house. Cotton plants were stripped and many were torn up by the roots.

A tornado moved east about 6 miles northeast of Brenham, Tex., at 5.30 p. m., attended by light rain, hail, and vivid lightning. The length of the path of this tornado was about 10 miles. Articles were carried up. The center of the track was swept clean and debris was scattered on either side. The destruction to property was estimated at \$10,000. A funnel-shaped cloud moving northeast was observed near Queen City, Tex. The storm was attended by heavy rain and small hail, and was destructive in a path 100 to 300 yards in width. One man and a number of horses were killed. On the north side of the path articles were thrown southeast, on the south side northwest, and in the center in all directions.

A tornado moving northeast, with rain, hail, heavy thunder, and vivid lightning, was reported near Elkhart, Tex., at 11 a. m. The path of destruction was about 200 yards in width. Two persons were injured, large trees were uprooted, a few houses were destroyed, and a number of buildings were unroofed. A destructive tornado was reported in Nacogdoches county, Tex., about 2 p. m. The storm appears to have followed an irregular northeast course in a path about 10 miles in length and 300 yards in width, wrecking buildings, etc., in its path. At Palestine, Tex., a thunderstorm from the west, with heavy rain, began 9.20 a. m. and ended 10.20 a. m. Heavy rain again began 4.40 p. m. and ended 9.20 p. m.; 2.74 inches of rain fell in 12 hours. Considerable damage was caused by high wind six miles southeast of Palestine.

A severe storm visited Paragould, Ark., at 11 p. m. The path of the storm was about 200 yards in width. Many residences were moved from their foundations, trees were prostrated, and outbuildings wrecked. Estimated damage, \$20,000. Unusually heavy snow in central and eastern Kansas, eastern Nebraska, and central Iowa delayed trains.

12-13th.—Exceptionally heavy rain fell at Memphis, Tenn., with a thunderstorm the evening of the 12th; 4.50 inches of rain fell in 23 hours and 20 minutes, and 3.22 inches in 12 hours.

13th.—A destructive tornado was reported in Pike county, Miss., at 9.30 a. m.; 4 persons were reported killed, 7 injured, and a number of buildings were damaged. A destructive storm was reported at Clinton, La., at 8.30 a. m. A heavy sleet and snow storm prevailed over eastern Kansas and parts of western Iowa and western Missouri.

17th.—A severe "norther" prevailed at Los Angeles, Cal.

In the San Gabriel and Altadena sections oranges were damaged by wind.

19-20th.—Rain and high wind prevailed along the Virginia coast; several vessels were wrecked and one life was reported lost. Gales continued along the south Atlantic and Virginia coasts during the 20th.

20-25th.—Exceptionally severe storms prevailed over the Pacific coast states. Heavy snow prevailed over Washington from the 21st to the 23d, causing damage to property and interrupting railroad traffic. At Tatoosh Island, Wash., an east gale prevailed from the 21st to the 23d, reaching a maximum velocity of 83 miles per hour at 7.35 p. m., 23d. At Olympia, Wash., 2 feet of snow fell from the 20th to 22d. At Port Angeles, Wash., the depth of snow exceeded one foot. At Portland, Oregon, about 2 feet of snow fell on the 22d and 23d; this was the heaviest snowfall on record at that station. At Baker City, Oregon, rain, with a southeast gale, prevailed during the 24th; some damage was caused by wind.

At Roseburg, Oregon, the barometer fell to 29.02 at 5.15 p. m. of the 24th. Rain continued at intervals during the morning. A gale began at 5.50 p. m. and the wind reached an extreme velocity of 56 miles per hour, the highest velocity ever recorded at station. Considerable damage of a minor character was caused by wind in and about Roseburg. At Eureka, Cal., the wind increased to a gale by midnight of the 22d, and the barometer fell to 29.17 (reduced) the morning of the 24th. At 1.30 p. m. of the 24th the barometer began to rise and the wind shifted suddenly to southwest and blew with great force, causing much damage to buildings. Streams in the surrounding country were flooded by heavy rain.

At San Francisco, Cal., rain and high southeast winds continued from the 22d to the 24th; much damage was caused by wind. At Keeler, Cal., rain began the evening of the 23d and continued during the 24th. At 12.10 a. m. of the 25th the pressure decreased suddenly and the wind increased from 10 to 50 miles per hour, with gusts from the southwest. Mountain streams north of Keeler were flooded.

25-26th.—Heavy snow and high winds delayed trains in eastern Kansas.

26-27th.—Exceptionally heavy snow fell in Virginia and the south Atlantic and east Gulf states. High winds prevailed along the Virginia and south Atlantic coasts. On the 27th a bark went ashore and was wrecked on the "Quicksands," 35 miles west of Key West, Fla.; the crew was saved.

29-30th.—An unusually severe windstorm visited Flagstaff, Ariz.; buildings were blown down, houses were unroofed, and trees were uprooted.

INLAND NAVIGATION.

ICE IN RIVERS AND HARBORS AND CLOSING OF NAVIGATION.

The Kennebec River was closed by ice on the 17th.

The Connecticut River was closed by ice on the 24th.

Navigation closed on the upper Hudson River on the 22d. On the 25th the river was frozen at Albany, N. Y. Navigation on the Hudson between New York and Poughkeepsie closed on the 27th.

On the 24th navigation on the Delaware River between Burlington, N. J., and Philadelphia, Pa., was suspended. On the 28th the Delaware was frozen at Beverly, N. J.

The canal and Raritan River were frozen at New Brunswick, N. J., on the 24th.

On the 25th, at Philadelphia, Pa., the Schuylkill River was covered with thin ice, and ice was forming rapidly on the Delaware River. On the 28th many vessels were unable to enter or leave the port of Philadelphia on account of heavy ice in the river.

The Clarion River was frozen over at Clarion, Pa., on the 23d.

Floating ice was reported in the Susquehanna River at Towanda, Pa., on the 20th and 21st. The Susquehanna was frozen at Lock Haven, Pa., on the 22d.

Navigation on the Allegheny River closed at Freeport, Pa., on the 23d. Navigation on the Monongahela River closed at Greensboro, Pa., on the 26th.

The Patapsco River was frozen at Woodstock, Md., on the 25th.

From the 27th to the 29th the Pamlico River was closed by ice at Washington, N. C.

Floating ice was reported in the Roanoke River at Weldon, N. C., on the 27th and 28th. On the 29th the Roanoke was closed by ice at Littleton, N. C.

Floating ice was reported in the Pedee River, at Cheraw, S. C., from the 29th to 31st.

Floating ice was reported in the Oostenaula River at Resaca, Ga., on the 29th and 30th.

The Kanawha River frozen at Charleston, W. Va., on 26th.

The Monongahela River was frozen at Fairmont, W. Va., on the 30th.

Floating ice was reported in the Wabash River at Vincennes, Ind., from the 22d to 24th. The Wabash was frozen at Mount Carmel, Ill., on the 23d.

The Illinois River was closed at Havana, Ill., on the 20th. At Ottawa, Ill., ice passed out of the Illinois River on the 2d; the river was frozen on the 12th, and ice passed out on the 14th.

At Lansing, Mich., the Grand River opened on the 2d and closed on the 18th.

At Brunswick, Mo., the Grand River closed on the 20th.

Ohio River.—At Pittsburg, Pa., navigation to points on the Ohio River was suspended on account of ice on the 24th. On the 27th the rivers were frozen over at Pittsburg. On the 28th navigation to points on the Monongahela River above Pittsburg was entirely suspended for the first time since February, 1889. At Wheeling, W. Va., floating ice was reported on the 23d, and navigation closed on the 28th. Large quantities of floating ice were reported at Marietta, Ohio, from the 25th to 31st. At Portsmouth, Ohio, the first floating ice was observed on the 26th; from the 27th to 29th river full of floating ice; 30th, ice gorged at Sciota bar at 4 a. m.; river in front of city closed, and persons crossing on the ice; 31st, ferryboat broke channel to mouth of Sciota, causing ice in harbor to move; after running about 45 minutes ice again gorged.

At Cincinnati, Ohio, the river was full of floating ice on the 26th; 28th, nearly all the boats, except regular mail packets, tied up; 29th, navigation almost suspended on account of heavy ice. At Maysville, Ky., navigation was suspended on the 29th; on that date an ice gorge was reported two miles above Maysville. At Louisville, Ky., the river was partially frozen, and navigation, except for ferryboats, was suspended on the 27th; from the 28th to 31st the river was full of floating ice at Louisville. Floating ice was reported at Paducah, Ky., from the 27th to 31st. At Vevay, Ind., heavy ice was running on the 22d, and on the 26th navigation was suspended. At Golconda, Ill., floating ice was noted from the 26th to 29th. The river was reported clear of ice at Golconda on the 31st.

Mississippi River.—At Red Wing, Minn., ice ran out on the 1st; 10th, river frozen over; 19th, teams crossing on the ice. At Davenport, Iowa, the river was full of floating ice from the 4th to 22d; 23d, river frozen over; 28th, teams crossing on the ice. At Fort Madison, Iowa, the river was closed by ice on the 20th. The river was frozen over at Muscatine, Iowa, on the 22d. At Keokuk, Iowa, running ice was reported on the 10th; 19th, heavy ice running; 20th, gorge formed south of city, but broke at 4 p. m.; 22d, gorge formed in early morning, and river closed. At Hannibal, Mo., a gorge formed above the bridge on the 18th, closing navigation. At Saint Louis, Mo., the river was frozen and navigation closed on the 28th.

Missouri River.—At Santee Agency, Nebr., 11th, river frozen; 13th, river open; 18th, river frozen; 22d, teams crossing on the ice. At Sioux City, Iowa, considerable ice was running from the 7th to 9th; 19th, drift ice gorged in the channel one mile above the pontoon bridge. At Kansas City, Mo., floating ice was reported on the 10th, 11th, and 14th to 17th; on the 19th the river was frozen. At Saint Joseph, Mo., the river above the gauge was gorged with ice on the 9th; 13th, river below the gauge gorged; 26th, river blocked with ice. At Glasgow, Mo., teams were reported crossing on the ice on the 25th. At Langdon, Mo., the river was closed on the 18th. The river was closed at Oregon, Mo., on the 8th, and at New Haven, Mo., on the 26th.

Lake Ontario.—The last boat of the season left Oswego, N. Y., on the 17th. Navigation at Charlotte, N. Y., closed on the 24th.

Lake Erie.—Navigation closed on the Erie Canal on the 5th. The last boat of the season from Chicago arrived at Buffalo, N. Y., on the 19th. The harbor at Buffalo was closed by ice on the 24th. Navigation closed for the season at Toledo, Ohio, on the 9th, and at Cleveland, Ohio, on the 10th. At Sandusky, Ohio, the bay was frozen on the 21st.

At Detroit, Mich., navigation closed on the 18th.

Lake Huron.—The last departure for the season for Lake Huron ports was made from Port Huron, Mich., on the 11th. On the 15th a steamer passed down the Lake, closing navigation for the season at Port Huron. From the 18th to 22d the Black River was frozen, and small quantities of floating ice were reported in the Saint Clair River and Lake Huron. Heavy floating ice was observed in the Saint Clair River and Lake Huron on the 23d, 24th, and 25th. On the 26th the Saint Clair River was closed by ice below Marine City. On the 28th navigation on the Saint Clair River was closed for the season. Navigation was closed at Alpena, Mich., on the 11th, and on the 20th Thunder Bay River was frozen. Navigation closed at Cheboygan, Mich., on the 10th. On the 26th the Straits of Mackinac were frozen. The ice in the Straits broke up by the close of the month.

The last up-river boat of the season passed Sault Ste. Marie, Mich., on the 4th, and the last boat of the season passed down the river on the 6th, closing navigation. On the 23d the river was frozen at Sault Ste. Marie, and ferryboats were tied up.

Lake Michigan.—The last boat of the season left Green Bay, Wis., on the 1st. The last arrival of the season at Green Bay was reported on the 4th, and navigation closed on that date. The Fox River was frozen at Green Bay on the 10th. Navigation closed at Grand Haven, Mich., on the 5th. Heavy ice filled the harbor at Grand Haven on the 22d. Navigation closed at Milwaukee, Wis., on the 10th. From the 21st to 23d the harbor at Milwaukee was filled with ice, and from the 25th to 27th the harbor at that place was frozen over. Navigation closed at Chicago, Ill., on the 15th, and at Marquette, Mich., on the 6th.

STAGE OF WATER IN RIVERS.

The following table shows the danger-points at the various river stations; the highest and lowest stages for the month, with the dates of occurrence; and the monthly ranges:

Heights of rivers above low-water mark Dec., 1892, (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Height.	Date.	Height.	Date.	
<i>Red River.</i>						
Shreveport, La.	29.9	28.9	29-31	11.1	1	17-8
<i>Arkansas River.</i>						
Fort Smith, Ark.	22.0	15.6	9	1.7	6	13-9
Little Rock, Ark.	23.0	19.9	16	6.6	6, 7	13-3
<i>Missouri River.</i>						
Fort Buford, N. Dak. *	.....	.....	.....	.....	.....	.....
Bismarck, N. Dak. ....	.....	.....	.....	.....	.....	.....
Pierre, S. Dak.	14.0	.....	.....	.....	.....	.....
Sioux City, Iowa *	18.7	.....	.....	.....	.....	.....
Omaha, Nebr.	18.0	.....	.....	.....	.....	.....
Kansas City, Mo.	21.0	4.8	10	2.7	14	2-1
<i>Mississippi River.</i>						
Saint Paul, Minn.	14.0	.....	.....	.....	.....	.....
La Crosse, Wis.	11.8	.....	.....	.....	.....	.....
Dubuque, Iowa *	16.0	.....	.....	.....	.....	.....
Davenport, Iowa *	15.0	3.9	22	0.1	15	3-8
Keokuk, Iowa *	14.0	3.0	22	0.8	18	4-4
Hannibal, Mo.	17.0	3.0	29, 31	1.3	21	4-3
Saint Louis, Mo.	30.0	5.6	11, 12	0.2	27	5-4
Cairo, Ill.	40.0	19.5	23	8.1	3	11-4
Memphis, Tenn.	33.0	14.8	25, 26	4.6	1.2	10-2
Vicksburg, Miss.	41.0	23.4	28, 30	3.1	1	20-3
New Orleans, La.	13.0	7.3	29, 31	3.1	1.4	4-2
<i>Ohio River.</i>						
Parkersburg, W. Va.	38.0	11.0	17	5.4	2	5-6
Cincinnati, Ohio.	45.0	17.2	21	6.4	31	10-8
Louisville, Ky.	24.0	8.4	22	4.6	13	3-8
<i>Cumberland River.</i>						
Nashville, Tenn.	40.0	22.2	20, 21	3.1	12	19-1
<i>Tennessee River.</i>						
Chattanooga, Tenn.	33.0	9.5	22	2.6	13, 14	6-9
Knoxville, Tenn.	29.0	.....	.....	.....	.....	.....
<i>Monongahela River.</i>						
Pittsburg, Pa.	29.0	10.5	15	1.4	25, 26	9-1

Heights of rivers—Continued.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Height.	Date.	Height.	Date.	
<i>Savannah River.</i>						
Augusta, Ga.	32.0	15.8	21	6.3	3	9.5
<i>Willamette River.</i>						
Portland, Oregon	15.0	11.2	29	0.8	15-18	10.4
<i>Susquehanna River.</i>						
Harrisburg, Pa.	17.0	4.2	12	0.9	24	3.3
<i>Alabama River.</i>						
Montgomery, Ala.	48.0	19.9	22	3.2	1.5	16.7
<i>James River.</i>						
Lynchburg, Va.	18.0	2.5	16, 17	0.2	13	2.3
* River frozen. † For 17 days. ‡ For 22 days. ‡ For 27 days. ¶ For 26 days. ¶ For 28 days.						

FLOODS.

Heavy rain the latter part of the month caused destructive floods over the greater part of California. In Humboldt county streams were flooded, and considerable damage was caused to property along the Eel River. High water was general throughout the Sacramento and San Joaquin valleys. On the 17th the stage of water at Sacramento, 28.7 feet, was the highest ever reached at that place. The levee on the Yolo county side of the Sacramento broke in several places, and large tracts of cultivated land were submerged. The San Joaquin River was reported the highest ever known and large areas of bottom land were overflowed. Heavy rain also flooded streams in the southern part of the state, causing considerable damage of a minor character.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroras were reported as follows: 4th, Winnebago, Ill.; Angola and Point Isabel, Ind.; Alta, Iowa; Orono, Me.; Cumberland, Darlington, and Fallston, Md.; Amherst, Concord, Fall River, Leicester, and Woods Holl, Mass.; Mottville, Mich.; Farmington, Fergus Falls, Maple Plain, Saint Olaf, and Sheldon, Minn.; Havre and Helena, Mont.; Moorestown, N. J.; Setauket, N. Y.; Bismarck, Napoleon, and Wild Rice, N. Dak.; Bangorville, New Berlin, Upper Sandusky, and Wooster, Ohio; Kingston and Narragansett Pier, R. I.; Pierre and Wolsey, S. Dak.; Dale Enterprise, Va.; Pine Hill, Wash.

5th, Nashua, N. H.; Woodbridge, N. Dak. 7th, Webster, S. Dak. 8th, Surface Creek, Colo. 11th, Cornish, Me.; Webster, S. Dak. 12th, Cresco, Iowa; Cornish, Gardiner, Houlton, and Orono, Me.; Sheldon, Minn.; Ashley, Bismarck, Grand Forks, Grand Rapids, Gallatin, Napoleon, Wild Rice, and Woodbridge, N. Dak.; Kimball and Webster, S. Dak.; Embarrass, Medford, and New Holstein, Wis. 13th, Cornish and Orono, Me.; Berlin Mills, N. H.; Fort Buford and Woodbridge, N. Dak. 14th, Fort Buford, N. Dak.; Phoenixville, Pa. 15th, Webster, S. Dak. 17th, Glendive, Mont.; Newark, N. J. 18th, Eastport, Me. 19th, Collegeville and Maple Plain, Minn.; Havre, Mont.

21st, Fort Buford, Gallatin, and Napoleon, N. Dak.; Medford, Wis. 22d, New Hartford, Conn.; Concord and Royalston, Mass.; Marquette, Mich.; Saint Olaf, Minn.; Nashua, N. H.; Number Four and Oswego, N. Y.; Fort Buford and Woodbridge, N. Dak.; Valley Junction, Wis. 23d, Concord, Mass.; Clear Lake, Collegeville, and Maple Plain, Minn.; Gallatin, Grand Forks, and Woodbridge, N. Dak.; Webster,

S. Dak.; Hartland, Vt.; Barron and Medford, Wis. 24th, Woodbridge, N. Dak.; Ellsworth, Ohio; Elkton and Webster, S. Dak. 25th, Collegeville, Minn.; Woodbridge, N. Dak. 26th, Collegeville and Wabasha, Minn.; Canton, Mo.; Berlin Mills, N. H.; Webster, S. Dak.

THUNDERSTORMS.

Description of the more severe thunderstorms reported for the month is given under "Local storms."

Thunderstorms were reported as follows: East of the Rocky Mountains they were reported in the greatest number of states, 14, on the 7th; in 10 on the 8th; in 11 on the 6th; in 6 on the 5th and 17th; in 5 on the 13th and 19th; in 4 on the 12th and 16th; in 3 on the 18th and 31st; in 2 on the 4th, 10th, 11th, 14th, 15th, 27th, and 30th; and in 1 on the 1st, 3d, 20th, and 23d. No thunderstorms were reported on the 2d, 9th, 21st, 22d, 24th, 25th, 28th, and 29th.

East of the Rocky Mountains thunderstorms were reported on the greatest number of dates, 12, in Texas; on 9 in Mississippi; on 7 in Louisiana; on 6 in South Carolina; on 5 in Arkansas, Georgia, and New York; on 4 in Alabama, Florida, Missouri, and Tennessee; on 3 in Indiana and Oklahoma; on 2 in Illinois, Indian Territory, Kansas, Kentucky, Michigan, New Jersey, Ohio, and West Virginia; and on 1 Maryland, Massachusetts, North Carolina, Pennsylvania, and Virginia.

West of the Rocky Mountains thunderstorms were reported in California on the 3d and 25th; in Nevada on the 24th; in Oregon on the 20th and 21st; and in Washington on the 4th, 7th, 8th, 16th, 17th, 20th to 24th, and 28th. In states and territories other than those named no thunderstorms were reported.

STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts and summaries are republished from reports for December, 1892, of the directors of the various state weather services:

ALABAMA.

Temperature.—The mean was 0.3 above the normal; maximum, 78, at Livingston, 4th; minimum, 9, at Florence, 27th; greatest monthly range, 69, at Florence; least monthly range, 54, at Maysville.

Precipitation.—The average was 0.36 above the normal; greatest monthly, 7.06, at Mobile; least monthly, 2.70, at Geneva. — P. H. Mell, Observer, Weather Bureau, Auburn, director.

ARIZONA.

Temperature.—The mean was 4.3 below the normal; maximum, 85, at Rancho del Pueblo, 13th and 14th; minimum, —5, at Flagstaff, 7th; greatest monthly range, 65, at Rancho del Pueblo; least monthly range, 45, at Oracle.

Precipitation.—The average was 0.93 below the normal; greatest monthly, 1.79, at Natural Bridge; least monthly, 0.00, at several stations.

Wind.—Prevailing direction, southwest.—J. C. Hayden, Observer, Weather Bureau, Tucson, director.

ARKANSAS.

Temperature.—The mean was 3.0 below the normal; maximum, 84, at New Gascony, 3d; minimum, —10, at Rogers, 26th; greatest monthly range, 80, at Rogers; least monthly range, 50, at Texarkana.

Precipitation.—The average was 4.34 above the normal; greatest monthly, 16.44, at Madding; least monthly, 3.17, at Keesees Ferry.

Wind.—Prevailing direction, north.—M. F. Locke, Commissioner of Agriculture, Little Rock, director; F. H. Clarke, Local Forecast Official, Weather Bureau, assistant.

CALIFORNIA.

Temperature.—Maximum, 88, at Duarte, 27th; minimum, 10, at Susanville,